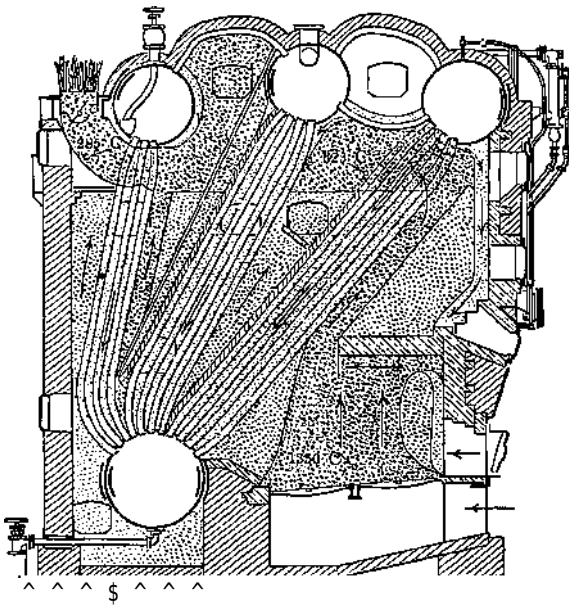
flues open before it, entirely forgetful of the fact that in gases, by reason of their high coefficient of expansion due to temperature changes, great variations of density occur. At a temperature of 1638° C. a cubic meter of air weighs 0.171 kg, while at 0° C. the same volume of air will weigh 1.293 kg or 7.5 times as much. The relative densities may be compared by likening the high-temperature air to water, weighing 62.5 Ib per cubic foot, while



3 Hot Gases Rising:
jjJEddy Areas of Partially chilled Gases
[^[Gases Chilled by contact with water
cooled

FIG. 168.—Diagram of Gas Flow in Stirling Type Boiler.

the low-temperature air may be likened to molten iron, which weighs 430 Ib per cubic foot or nearly 7 times the weight of water.

One thing that has tended to obscure this great difference in

density that occurs in gases is the fact that most engineering works, in considering the gases passing through a boiler, supply the information as *weight of gases,* allowing the investigator to lose sight of the fact that a unit weight of gas in the firebox will occupy approximately three times the volume it does when it